PCT/AU00/00413

4

Patent Office
Canberra

10/030887

I, LEANNE MYNOTT, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PQ0237 for a patent by BRITAX RAINSFORDS PTY LTD filed on 07 May 1999.

WITNESS my hand this
Twenty-third day of May 2000

LEANNE MYNOTT
TEAM LEADER EXAMINATION
SUPPORT AND SALES

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

BRITAX RAINSFORDS PTY LTD

ORIGINAL

AUSTRALIA

PATENTS ACT 1990

PROVISIONAL SPECIFICATION FOR AN INVENTION ENTITLED:-

"METHOD OF PRODUCING A PLASTICS MOULDED PART INCLUDING A FILM COVERING"

This invention is described in the following statements:-

The present invention relates to methods of producing plastics moulded parts having a film covering and in particular to a method of incorporating a film into an injection moulding process to thereby form a component having a film covering.

Moulding, and in particular injection moulding, is used in many applications to mass produce plastics components at low unit cost. A characteristic of the conventional injection moulding process is that, because only one plastics material is injected into the mould, the resultant component has relatively uniform properties throughout. In applications where different material properties are required for different areas of a component, this can produce difficulties and/or result in the need for further steps to produce a final product. For instance, in many applications it is desirable to change the surface characteristics of a plastics component produced by injection moulding (to provide hardness, colour, reflectivity etc.).

One way of changing the surface properties of a part produced by injection moulding is to cover (partially or fully) that part with a film. Such a film may add abrasion resistance, colour, or reflectivity for instance.

The addition of a film after the injection moulding process adds cost and complexity to the production of plastics moulded parts having a film covering.

By way of example, it is known to apply thin plastic film to a vehicle external mirror housing to provide colour matching to that of the body of the vehicle and to add abrasion resistance. Known techniques for such application add complexity to the production of mirror housings.

It is an object of the present invention to provide an improved method of producing a plastics moulded part having a film covering.

SUMMARY OF THE INVENTION

having a thin film covering, comprises the steps of:

1. positioning a film over a cavity formed by two separable die parts;
2. evacuating the air from said cavity so as to form said film against the walls of said cavity;
3. closing said two separable die parts against a third die part, by relative movement of either of said two separable die parts or said third die part, so as to form a closed mould cavity bounded by said three die parts;
4. injecting plastic into said closed mould cavity;
5. opening said mould by separating said two separable die parts;
6. separating said third part from its adjacent die part, by relative movement of either said adjacent die part or said third die part; and
7. removing said moulded part.

Preferably said step of closing said two separable die parts against a third die part is a partial closure and preferably after said step of injecting plastic there is a further step of totally closing said two separable die parts against said third die part to form said moulded part.

Preferably said further step of totally closing further includes cutting said film.

A specific embodiment of the invention will now be described in some further detail with reference to and as illustrated in the accompanying figures. This embodiment is illustrative, and is not meant to be restrictive of the scope of the invention.

DETAILED DESCRIPTION OF A PREFERRED METHOD ACCORDING TO THE INVENTION

A preferred method according to the invention is illustrated in the accompanying representations in which:

Fig 1 shows a three plate die suitable for producing a plastics moulded part having a thin film covering;

Figs 2 to 7 show the three plate die of Fig 1 in progressive positions for producing a plastics moulded part having a thin film covering.

Referring to Fig 1, a three plate die is shown comprising a cavity die plate 15, an intermediate die plate 20 and a fixed die plate 25. A bore 27 is provided in fixed die 25 to allow molten plastic to be injected into the mould cavity as shown in Fig 4. Again referring to Fig 1, there is provided a vacuum bore 17 communicating with groove 18 to allow evacuation of air or gas from the mould cavity. Intermediate die plate 20 is provided with a groove 22 which houses a compressible seal 30. Compressible seal 30 provides a gas tight seal between intermediate plate 20 and cavity die plate 15 as shown in Fig 1. Therefore once thin film 40 is placed against the intermediate die plate 20, a vacuum applied through evacuation of air or gas via vacuum bore 17 will cause thin film 40 to form against the mould cavity walls 16 and 21. This is explained in further detail below. Fixed die 25 has an edge 28 adapted to cut thin film 40 when die parts 20 and 25 are closed together.

Figs 1 through to Fig 7 show progressive stages in which a plastics moulded part having a thin film covering is produced. The first part of the process is shown in Fig 1. In this first step, cavity die plate 15 and intermediate die plate 20 are closed together compressing seal 30. Fixed die plate 25 is spaced apart from intermediate die plate 20 to allow thin film 40 to be inserted into the position shown in Fig 1.

The second step in the process of producing a plastic moulded part having a thin film covering is the evacuation of the air or gas from the space bounded by cavity walls 16, 21 and the thin film 40. This step is shown in Fig 2. At the end of this step, the film 40 is formed against the mould cavity walls as shown in Fig 2.

In the third step shown in Fig 3, the joined cavity die plate 15 and intermediate die plate 20 are moved into partial engagement with fixed die plate 25.

In step four, shown in Fig 4, while a gap is maintained between the die plates 20 and mould cavity wall 26 (cavity wall 26 shown in Fig. 1).

In the fifth step shown in Fig. 5, the joined cavity die plate 15 and intermediate die plate 20 are moved into engagement with fixed die plate 25. In this step, cutting edge 28 cuts film 40 and molten plastic material is compressed and bonds to film 40.

Fig 6 shows the opening of the three plate die at the split line between cavity die plate 15 and intermediate die plate 20. Part 45, in this case a vehicle external mirror housing, is now partially released from the mould cavity.

Step seven is shown in Fig 7 in which part 45 is ejected from the mould by the action of intermediate die plate 20 separating away from fixed die plate 25. This completes the process of producing a plastic moulded part having a thin film covering.

The process can then be repeated, commencing with intermediate die plate 20 moving to the position shown in Fig 1 and a new film 40 being inserted into position as shown in Fig 1.

The part 45 ejected in step seven as shown in Fig 7, is complete with an integral film 40 covering its convex surface. No additional steps are required as a bond is formed between film 40 and part 45 as the molten plastic cools within the moulding process outlined above.

The above described process will have many applications. One such application is in the production of vehicle external mirror housings. It is often desirable to produce external vehicle mirror housings having an outer surface that is coloured to match the body colour of the vehicle and which is abrasion resistant. This can easily be achieved with the above described process being used to apply a suitable film 40.

Different films 40 may be used on different parts depending on the surface characteristics required. One such example of a film is a laminate with a clear abrasion resistant outer layer, a coloured middle layer and an inner layer of a material that will readily bond to the molten plastics. One such suitable inner layer is ABS. Another suitable inner layer is ASA. These materials will bond satisfactorily to molten ABS or molten LEXAN.

The above described process provides an improved method of producing a plastics moulded part having a film covering. The method enables the production of a plastics moulded part having a thin film covering in a single process.

While the present invention has been described in terms of a preferred method in order to facilitate a better understanding of the invention, it should be appreciated that various modifications can be made without departing from the principles of the invention. Therefore the invention should be understood to include all such modifications within its scope.

Dated this 7th day of May 1999.

BRITAX RAINSFORDS PTY LTD
By its Patent Attorneys
MADDERNS

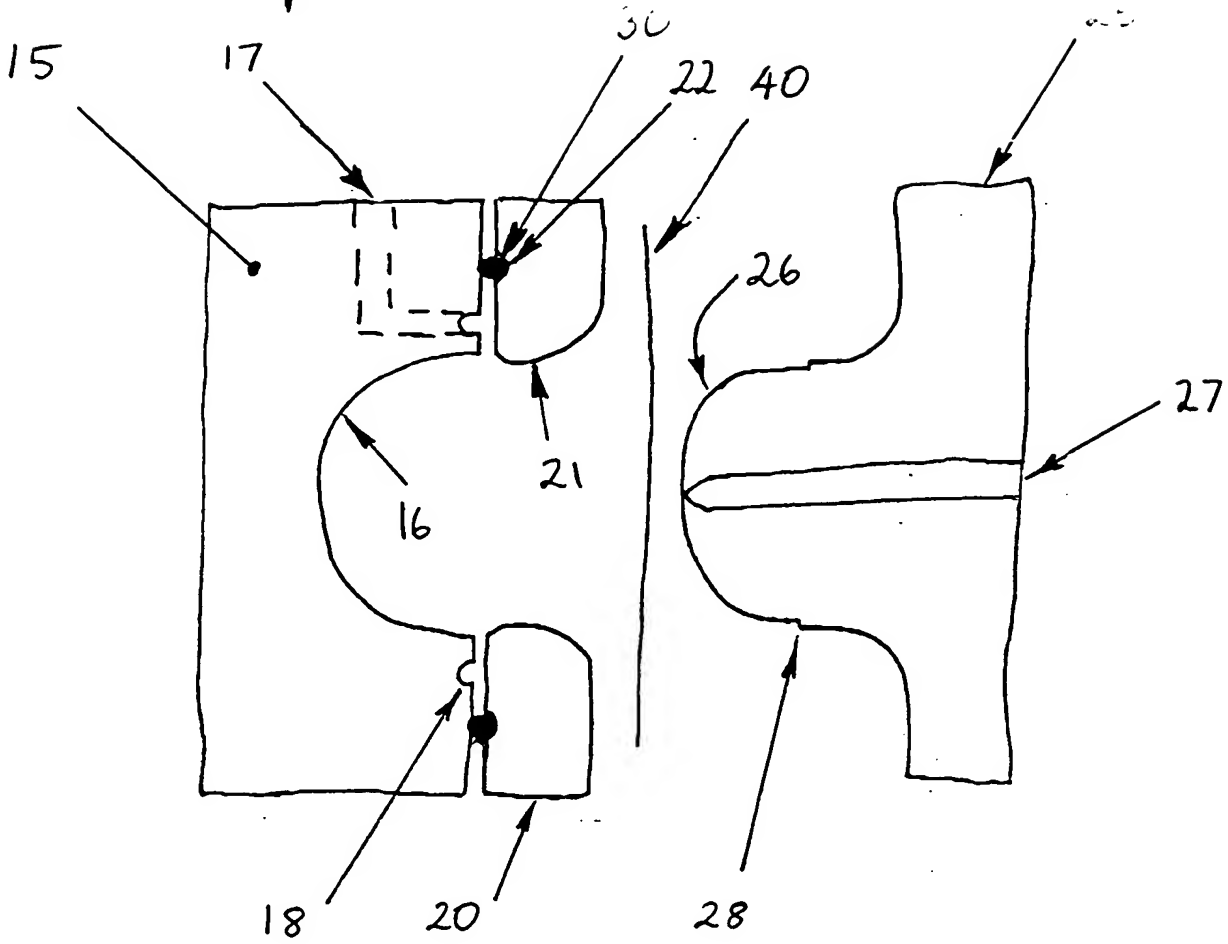

FIG. 1

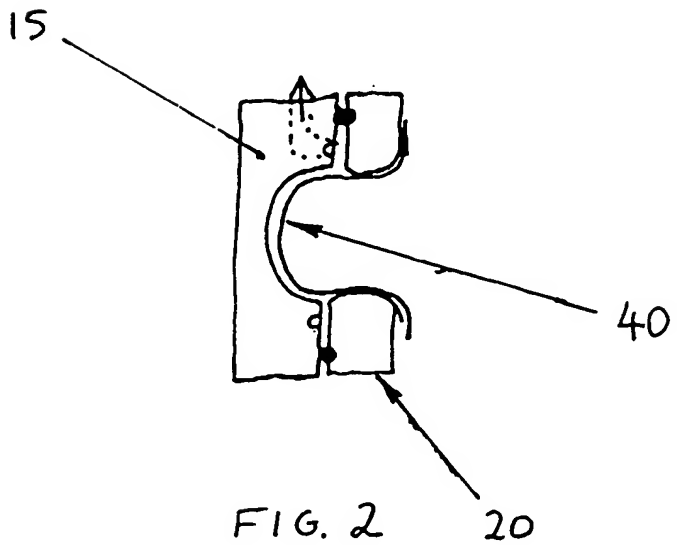

FIG. 2

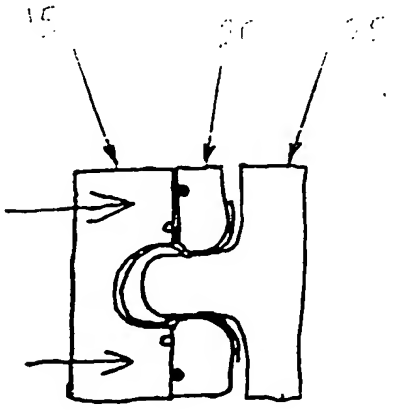

FIG. 3

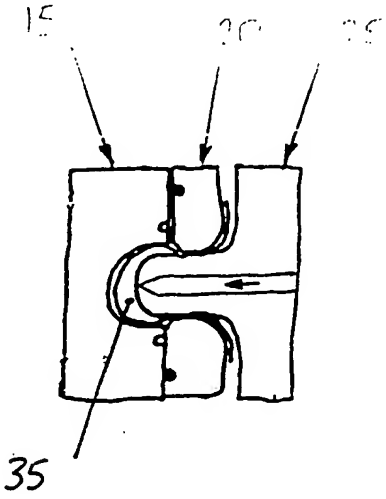

FIG. 4

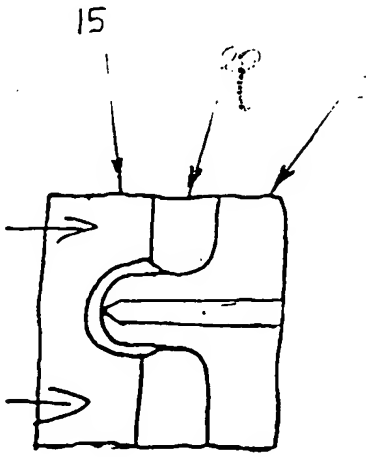

FIG. 5

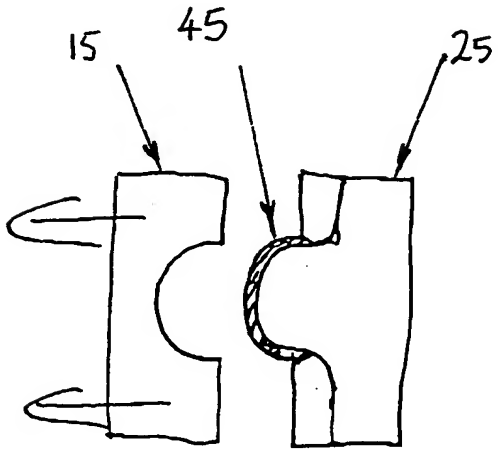

FIG. 6

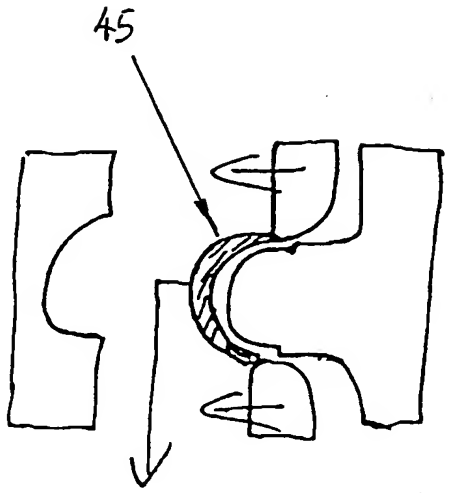

FIG. 7